Space Weather Forecast

Issued on Wednesday, 07 February 2024 at 13:28 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Moderate activity and occasional R1-R2 Radio Blackouts expected. Chance of isolated Strong flares which may produce R3 Radio Blackouts, risk mainly Day 1 (07 Feb).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate, with isolated M-Class flares, peaking at 07/0331UTC from a complex region in the southwest disc. There are twelve sunspot regions on the visible disc, however the majority of these are small and relatively stable with only two regions of note. There is a large and active region on the southeast disc, with a complex structure, particularly in its lead portion. Significant magnetic looping is evident in SDO imagery between this region, and several other regions on the southeast disc in close proximity. The complex region in the southeast is smaller but has been responsible for the M-Class flares in the past 24 hours. The viewing angle and position of this region in the southwestern disc precludes an accurate analysis, however magnetic complexity of the trailing spot is still apparent.

Several Coronal Mass Ejections (CMEs) left the disc during the period which may have produced Earth-directed components. A large halo CME visible on coronagraph imagery from around 06/1200 UTC has been assessed as far-sided. Analysis and modelling of a narrow filament lift-off from the center northern disc at a similar time suggests a miss. A CME that left the disc from near the complex region in the southwest at 06/1830 UTC is projected to miss, however a glancing blow may be observed late Day 3 (09 Feb) or early Day 4 (10 Feb). A CME that left the disc from a similar location early on Day 1 (07 Feb) has been analysed and awaits Enlil modelling.

Solar Wind / Geomagnetic Activity: Solar winds were initially indicative of a weak fast wind from a coronal hole and possible transient CME influence. Slightly elevated winds at just under 500km/s have gradually declined since 07/0000 UTC towards 430-470km/s. The Interplanetary Magnetic field (IMF) was weak. The important north-south component fluctuated weakly. Geomagnetic activity was Quiet (Kp0-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles became slightly elevated following a Moderate flare early on the 06 February but remained below the S1 threshold and has slowly returned to background.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity expected, with further Moderate flares and an initial chance of Strong flares. These most likely from either the large complex region in the southeast, or from the smaller complex region in the southwest. This risk decreases slightly as the region in the southwest departs the disc Day 2 (08 Feb).

Solar Wind / Geomagnetic Activity: Any residual enhancement to solar winds from coronal hole influence is expected to wane through Day 1 (07 Feb), with wind speeds trending towards slow-ambient levels. A CME that left the Sun in association in the morning of 06 Feb may provide a slight glancing blow late Day 3 (09 Feb) or early Day 4 (10 Feb). The CME associated with a Moderate class flare earlier on Day 1 may give some slight enhancement at Earth later in the period, but this is both low confidence and a low probability. Geomagnetic activity is expected to be mostly Quiet (Kp 0-2), with a chance of Unsettled intervals (Kp 3) and a very slight chance of a G1/Minor Geomagnetic Storm interval (Kp 5), should any CME enhancement occur Days 3-4.

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Energetic Particles / Solar Radiation: The count rate of energetic particles has a chance of rising above background in response to any large flares that may occur. This will bring a slight chance of reaching S1/Minor Solar Radiation Storms.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	70	70	70
Very Active	R3 to R5 X	No	25	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	20	20	20
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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